POTENTIAL FOR REDUCING COOPERATIVE COTTON GINNING COSTS IN ARKANSAS

- CONSOLIDATION
- CENTRAL GINNING
- VERTICAL COORDINATION

U.S. DEPARTMENT OF AGRICULTURE•FARMER COOPERATIVE SERVICE

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Farmer Cooperative Service strengthens the economic position of farmers and other rural people by improving organization, development, management, and operation of their cooperatives. It works directly with cooperative leaders and Federal and State agencies on cooperative problems. It publishes research results and educational materials and issues the *News for Farmer Cooperatives.*

The Service helps (1) farmers and other rural residents get better prices for products they sell and obtain supplies and services at lower cost; (2) rural residents use cooperatives to develop and make effective use of their resources; (3) cooperatives improve their services and operate more efficiently; (4) patrons, directors, employees, and the public to better understand how cooperatives work and benefit their members and their communities; and (5) encourage international cooperative programs.

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HIGHLIGHTS

Potential ways to reduce the cooperative ginning costs in Arkansas include:

- Directors and members assuming firmer control over gin costs. Disparities in costs between gins of similar size and output were wide.

- Dismantling and selling gins with inadequate volumes. Their members should join other nearby cooperative gins. Such consolidation has much potential for increasing savings.

- Central ginning, a longer term step, could provide substantial savings—$5 to $10 a bale. It cannot be a short-term process, because the entire cotton marketing process would change. Instead of cotton being ginned for growers, growers would sell seed cotton to a very large central gin. Hourly capacity would increase 10 percent because of ginning larger lots in more uniform condition, no loss of time between loads of cotton from different growers, and no idle crew time waiting for cotton to be delivered to the gin.

- Vertical coordination by expansion of a large cooperative's activities into an oil mill, a warehouse, and a compress. This is another long-term process, but it could save growers another $5 or more a bale.

These savings were estimated by projecting costs for central gins in Arkansas, and checked by comparing costs of 24 cooperative Arkansas gins with those of American-made central gins in foreign countries. The main difference lies in the U.S. practice of ginning for growers at their demand. In foreign countries, growers sell seed cotton to cooperatives, merchants, and others who gin the cotton over a longer period, with resultant savings from continual operation, lower power costs, and a more economical plant.

The Farmer Cooperative Service recommends that cotton growers organize a cooperative association to test central ginning and—if it is found practical—add the other related activities as conditions warrant. This could be done by consolidating or merging with other cotton cooperatives, or by adding divisions to handle the activities.

There also may be opportunities and need for cotton cooperatives to enter textile manufacturing and marketing through a federation of large cooperatives. Feasibility should be thoroughly studied first, of course. These suggestions apply to cooperative gins in other cotton producing States.

Potential for Reducing Cooperative Cotton Ginning Costs In Arkansas

- **Consolidation**
- **Central Ginning**
- **Vertical Coordination**

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Lower U.S. cotton production in recent years, together with declining market price trends and rising costs, have resulted in serious economic problems for many cotton growers. Increased use of synthetics and imported fabrics has displaced cotton in many uses. Growers are looking for ways to increase their net returns from cotton, and a larger share of the textile market.

PURPOSE AND METHOD

The purpose of this study is to evaluate the opportunities for cotton growers to increase their net incomes from cotton through cooperative action to reduce gin and other costs.

The primary gin cost data used in this study came from 32 Arkansas cooperative gins. The relationships, other findings, suggestions, and recommendations on ginning apply specifically to the cooperative gins studied but they also have broad application to similar gins in nearby States. And some of them, such as seasonality, apply to most or all other cooperative gins.

Most of the data on cooperative cottonseed oil mills, warehouses and compresses, and cotton marketing came from States other than Arkansas and the comments apply generally in most areas where cotton is produced in commercial volumes. Nearly all the data on textile mills came from sources outside of Arkansas and the comments apply generally with limitations on areas remote from textile mills.

The operations studied include cooperative ginning, storing, handling, and further processing and marketing of cotton and cottonseed products. The increases in net incomes would come primarily from reductions of costs by increases in efficiency of operations and from improvements in quality of lint.

Managers or other representatives, such as bookkeepers, directors, or ginners, were personally interviewed at 32 of the 38 cooperative gins active on the 1968 Arkansas crop. Cost data were obtained from audits. Most of the other data, such as bales ginned per day, were also obtained from gin records. Some data, such as gin capacity per hour and season, were obtained from managers. Where the primary data were inadequate for the study, appropriate secondary data were used if they were available on Arkansas or other States. In areas where neither primary or secondary data were available, projections and estimates were used.

Managers or other representatives of most of the few other Arkansas cotton cooperatives were also personally interviewed, and limited data were obtained from some of them. Consequently, secondary data were used for most of that part of the study as well as for the textile mill portion of the study.

Cotton ginning was analyzed first and in more detail than the other operations. Ginning is the most costly phase in cooperative processing,

handling, and marketing of cotton up through the baled lint stage. Discussions of cooperative cottonseed oil milling; warehousing, compressing, and marketing of lint; and textile manufacturing and marketing follow in that order.

COOPERATIVE GINNING COSTS, RELATED FACTORS, SUGGESTED IMPROVEMENTS, PROBLEMS, AND POTENTIAL ALTERNATIVES

Over 99 percent of the U.S. cotton crop is now ginned for growers before they sell it. Growers commonly pay a cash charge for ginning, usually with the proceeds from sales of cottonseed to ginners. Ginners usually get some additional revenue in the form of a gin margin between the prices they pay growers and the prices cottonseed oil mills pay them with little or no additional expense. Such margins amount to additional indirect charges to growers for ginning.

Cooperative gin charges in 1968 were estimated to average $18.50 per 500-pound bale. Cooperative gins usually make the same charge as prevails in their areas or State (10).[1] Cooperative gin margins on cotton seed were estimated to average $2 a bale in 1968. Direct and indirect charges totaled over $20 a bale or over 4¢ a pound of lint. And gin charges appear likely to increase further.

A major reason for organizing cooperative gins was to save part of the direct and indirect ginning charges growers paid. To do that, costs of operating gins must be less than direct and indirect charges. But costs of gin equipment, repairs, labor, and other items of ginning costs have increased faster than charges for several years. Many cooperative gins now have difficulty meeting their expenses from their revenues.

Besides the direct and indirect charges growers pay for ginning, this process is important to them because it may affect the quality of their cotton. Unless care and skill are used and conditions are favorable, ginning may lower the quality of the cotton substantially below what could have been obtained.

Growers desire the highest quality ginning services practical under prevailing conditions. This was another major reason for organizing cooperative gins, which on the whole, have provided high quality ginning. However, it now appears that gin services could be substantially further improved by alternative practices and procedures such as blending seed cotton to make uniform lots.

[1] Underscored numbers in parentheses refer to items in the Literature Cited, p. 24.

Costs of 24 Cooperative Gins

In this report, both unweighted and weighted ginning costs per bale were used. Unweighted costs, or average costs per bale of each of the 24 cooperative gins, were used in analysis of the gins as they now operate. Weighted costs, or the total costs of the gins divided by the number of bales the group ginned, were used for some of the comparisons with other methods of organizing and operating gins, such as consolidated gins.

The unweighted costs per bale of the 24 gins averaged $20.05 a bale. Costs weighted by number of bales ginned for the same gins averaged $18.83. Average cost per bale for each gin had equal weight, regardless of volume ginned, in unweighted costs, but lower costs per bale of gins with larger volumes caused weighted costs to average lower.

Costs of some of the gins were over twice as much a bale as others (table 1). These differences indicate there are potential ways of reducing the 1968 costs of some gins. The costs and volumes in table 1 reflect the economies of scale for larger volumes. Costs of individual gins and statistical analyses indicated other factors also influenced ginning costs.

Items of Ginning Costs and Their Relative Importance

The costs of the 24 cooperative gins were grouped into 10 items (table 2). Nine of the items were usually listed separately in gin audits. Other items were often listed in different ways and combinations in the various audits. These items were combined into "Other." In many of the audits, workmen's compensation insurance was included in insurance costs but the recorded or estimated amount was transferred to operating labor, since it was a part of the direct cost of labor. Many audits included the gin's portion of social security payments in taxes but we also transferred the recorded or estimated amounts of such payments to salaries and operating labor costs.

Table 1.–Frequency distribution of 24 Arkansas cooperative gins by cost groups, average costs, and volumes of groups, 1968 crop

Ginning costs per bale	Gins	Average costs per bale of group	Average bales per gin in group
	Number	*Dollars*	*Number*
Less than $15	4	14.19	3,011
$15 - $19.99	10	17.61	2,699
$20 - $24.99	5	20.95	2,156
$25 and over	5	28.75	1,613
Total	24	---	57,925
Average	--	20.05	2,414

Table 2.–Average gin costs for 24 Arkansas cooperative gins, 1968 crop.

Item	Average cost per bale[1]	Percentage of total
	Dollars	*Percent*
Salaries and wages:[2]		
Managers[3]	1.45	7.2
Office salaries	.78	3.9
Gin labor (operation)	5.11	25.5
Subtotal	7.34	36.6
Utilities	1.80	9.0
Gin repairs, gin repair labor, and supplies	1.57	7.8
Bagging and ties (cost)	2.65	13.2
Depreciation	4.15	20.7
Taxes	.37	1.9
Insurance	.75	3.7
Other	1.42	7.1
Total	20.05	100.0

[1] The average cost per bale of items for each of the 24 gins were calculated, then totaled and divided by 24 to find amounts shown. These costs are therefore unweighted by bales ginned by group.

[2] Social security payments by gins were calculated at a rate of 4.4 percent of all salaries and wages, deducted from taxes (unless listed separately in audits) and added to salaries and wages. Workmen's compensation insurance was calculated at 8.0 percent of gin labor (operation), deducted from insurance and added to gin labor.

[3] Managers received no pay at 4 gins, and only token or part-time pay at 8 others.

Many gins combined costs of repair labor with gin repairs and supplies. Neither workmen's insurance nor social security payments was included on repair labor, as labor could not be separated from parts and materials in many cases. Hauling costs on bales and cottonseed and other costs not directly connected with ginning were omitted.

Salaries and wages, 37 percent, and depreciation, 21 percent, led all other costs.

Costs of bagging and ties averaged $2.65 a bale and accounted for 13.2 percent of total costs. This item varied less among the 24 gins than any other.

Operating labor and depreciation together equaled nearly half of the total costs.

Factors Related to Ginning Costs

This section discusses the specific relationships of volumes, gin capacities, seasonality, labor problems, and depreciation to costs among the 24 gins. Data from some of the other eight gins included in the study (but from which usable cost data were not obtained) were included where appropriate.

Volumes Ginned

More specific relationships of volumes to ginning costs than were shown in table 1 are given in figure 1. The average cost curve represents the average costs that would be expected for these gins which are represented by dots. Dots located above the curve indicated higher costs than would be expected. The correlation coefficient for the average cost curve was 0.60.

The average cost curve in figure 1 shows a ginning cost of $14 a bale for a 4,500-bale volume and $24 a bale for a 1,000-bale volume. It also shows a cost of over $20 a bale for volumes below 2,000 bales. These relationships reflect a need for consolidation of gins with volumes of about 2,000 bales or less. Consolidations will be discussed later in detail.

Gin Capacities

Several gin managers indicated during the interviews that they thought installation of high-capacity gin equipment would lower ginning costs by reducing labor requirements. In this study, any gin equipped so that it could gin over 7 bales an hour was classed as high-capacity. Eight of the gins had high-capacity equipment. Consequently, some data were obtained on costs for Arkansas plants where high-capacity gin equipment was used.

Capacities per hour for gin stands with various numbers and sizes of saws were developed for the gins included in the survey, based on hourly capacities reported by the gin managers interviewed and from other data. Then gin capacities per hour for the gins studied were estimated. Time for maintenance and changing between loaded trailers of different growers was included.

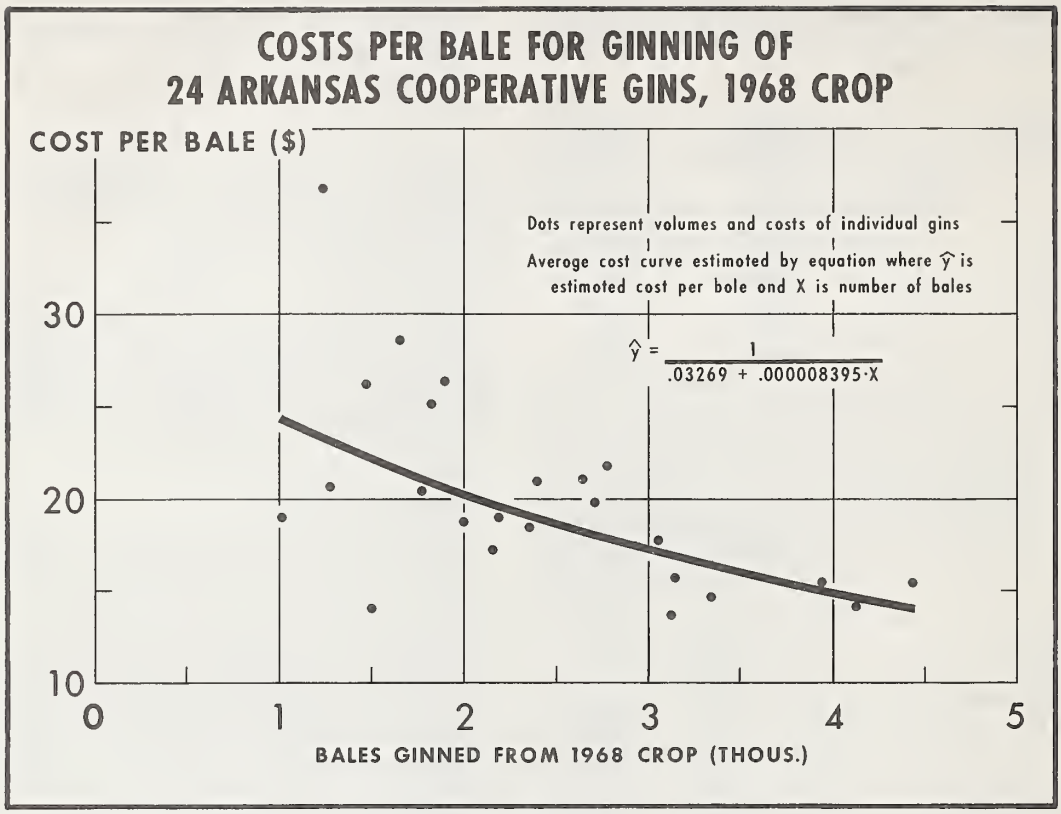

FIGURE 1

Data on numbers and sizes of saws in stands of 28 of the 32 gins studied and the estimated average capacities under Arkansas conditions were as followers:

Saws per stand	Diameter of saws	Estimated capacity per hour/stand
(Number)	*(Inches)*	*(Bales)*
80	12	1.2
90	12	1.4
88	12	2.5
120	12	2.5
80	18	3.5
120	16	4.0
120	18	4.5
178	11¾ and 12	4.5

The hourly capacities calculated according to the above rates totaled 99 percent of the total hourly capacities reported for them by these gin managers. Different managers reported somewhat different capacities for gins with the same size gin stands, while calculated capacities were of course equal for all gins with the same size stands.

The high- and low-capacity gins were separated and the total costs of the individual gins with volumes of 2,000 or more bales were charted with average cost curves for each group (fig. 2). Costs of low-capacity gins with less than 2,000 bale volumes were omitted since none of the high-capacity gins had volumes below 2,000 bales. Furthermore, gins with less than 2,000 bales need consolidating, as indicated by figure 1, because costs equal or exceed gin charges.

As stated previously, the correlation coefficient of volume to costs for the 24 gins was 0.60. But it was 0.67 for the seven low-capacity gins included in figure 2 and 0.77 for the eight high-capacity gins. Larger proportions of costs were determined by volumes on high-capacity gins than on low-capacity gins where both had volumes of 2,000 or more bales.

As estimated by the equations on charts, costs were about 75 cents a bale higher for high-capacity gins than for low-capacity gins on 2,000-bale volume. And estimated costs were about $1.30 a bale higher for high-capacity gins than for low-capacity gins on 4,000-bale volumes. Within the range of 2,000 to 4,000 bales, high-capacity gins would average about $1 a bale higher cost according to the average cost curves. These costs do not include interest on investments.

Differences in investments in high- and low-capacity gins, with volumes over 2,000 bales, at the time of the survey averaged about $30,000.

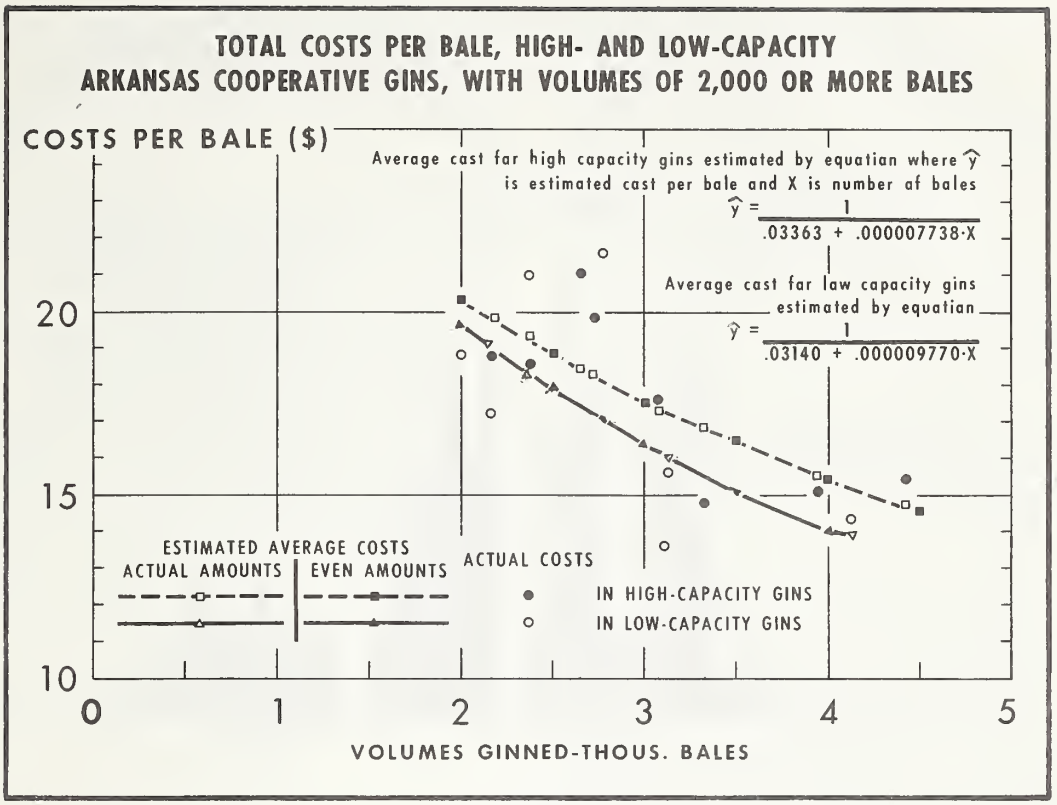

FIGURE 2

Interest of 7.5 percent on that amount would have increased differences in costs by about 50¢ to $1 a bale and resulted in an average difference of about $1.75 higher cost for high-capacity gins in Arkansas on this volume range.

If the high-capacity gins had received volumes closer to their satisfactory capacities, their costs would have been lower as indicated by their cost curve in figure 2. The volumes they did receive averaged 3,082 bales per gin, equaled only 53 percent of their average seasonal capacity. According to figure 2, the volume of these high-capacity gins would have to average 4,800 bales to get their costs as low as the low-capacity gin cost curve for 4,000 bales, which was about the maximum volume the low-capacity gins could handle satisfactorily. That would have been about 1,700 bales more per gin than high-capacity gins averaged. Inadequate volume is one of the risks involved in installing high-capacity gins.

Seasonality and Seasonal Capacity of Cotton Gins

The amount of cotton a gin can handle satisfactorily during a season or year depends upon its hourly capacity and on when cotton is available for ginning. Under the present method of ginning cotton for growers, seasonality largely determines when cotton is available for ginning.

On the average, about 65 percent of the cotton was delivered to the gins in a peak period of approximately 21 days. An example of seasonality is shown in figure 3 where the numbers of the bales ginned by days are charted for the season for a 10.5-bale-per-hour gin and the peak periods are indicated. That gin had a 22-consecutive-day peak (counting only days on which cotton was ginned). Rainy periods or other unfavorable weather often break the peak period into segments but 30 consecutive days when cotton was ginned or 21 days of highest volumes included the peaks at most of these gins. The 19 gins on which data were obtained handled 44 to 74 percent of their volumes in 21 consecutive days (not including days on which no bales were ginned); 53 to 80 percent of the bales were ginned in the 21 highest volume days.

Those 19 cooperatives ginned an average of 65.4 percent of their volumes in 21 highest volume days. Thirty consecutive days on which cotton was ginned included the peaks as well as low days before and after rains. In 30 consecutive days, including the peaks, the 19

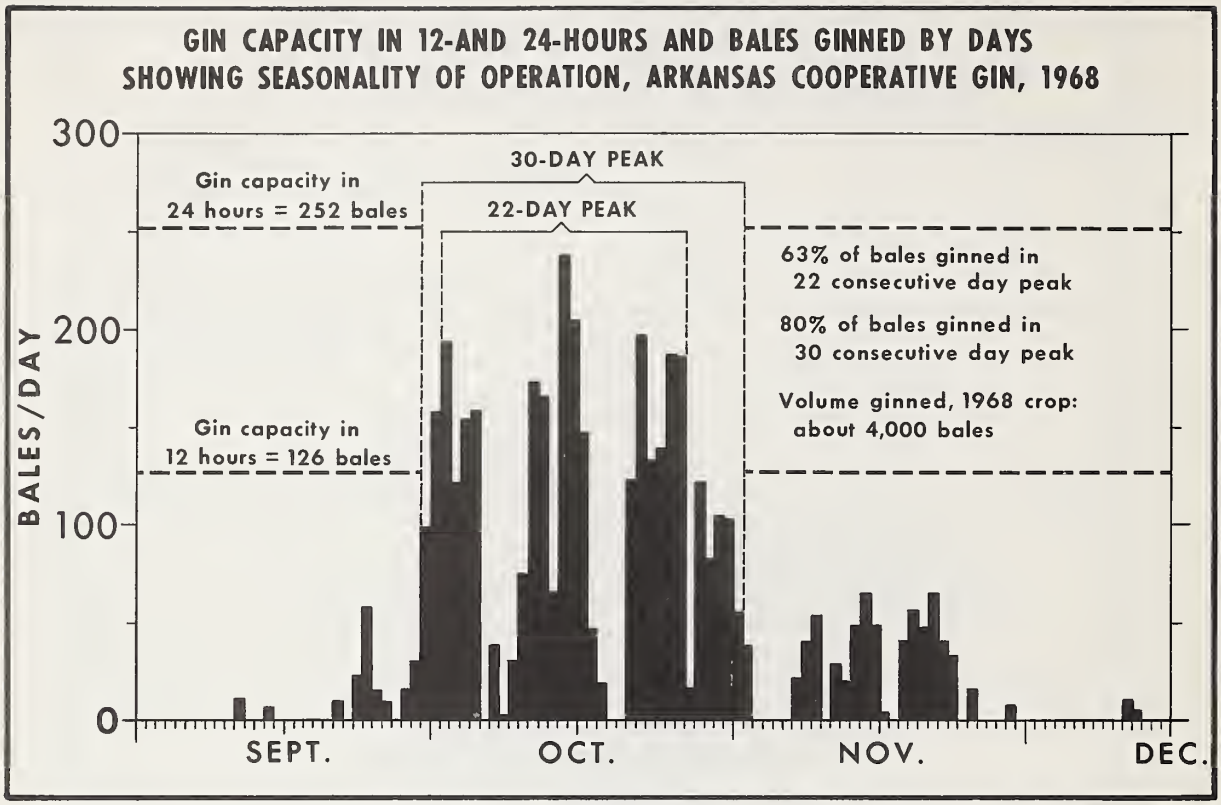

FIGURE 3

Arkansas cooperatives ginned 60 to 89 percent of their volumes from the 1968 crop and they averaged ginning 76 percent of their volumes.

Similar seasonality was found in California, Texas, and Oklahoma (6, pp. 14, 15, and 16); and (9, pp. 12-15). The weather influences the exact nature and time of the peaks and they vary between gins in a State or even within counties. But seasonality of cotton harvesting appears to be a common characteristic, especially where cotton is harvested with machines, and over 95 percent of the Arkansas crop was so harvested in 1968 (10).

Seasonality limits the amount of cotton a gin can handle satisfactorily during a season or a year where cotton is ginned for growers. If a gin receives more cotton than it can handle satisfactorily within 24 hours during the peak period, growers take their cotton to another gin if an uncrowded one is available.

Many growers and commercial cotton harvesting machine operators own or borrow enough trailers to hold the cotton they can harvest in one day. But if the gins do not empty the trailers by the next day when they are needed, they have to stop harvesting or pile cotton on the ground which they do not like to do. The optimum time for harvest operations is short—about 2 weeks—and cotton may suffer grade damage or even loss from storms if left in fields past the optimum period for harvesting.

In California and Texas, when volumes of 10-bale-an-hour size co-op gins exceed 6,000 bales a year, members often become dissatisfied with the time they have to wait and build an additional gin. Similar relationships apply on other sizes of gins as well but on different volumes.

Data on bales ginned by days from Arkansas, California, Oklahoma, and Texas indicate that when gins operate at their maximum capacities they can satisfactorily handle only about 75 to 80 percent as many bales during the peak period as they would be expected to handle on the basis of their hourly capacities. For example, a 10-bale-an-hour size gin would be expected to gin 240 bales in 24 hours and about 5,040 bales in a 21-day peak. Instead they gin a maximum of about 80 percent of that amount or 4,032 bales. Since gins averaged 65 percent of their volumes in 21 peak days, a 10-bale-an-hour gin that processed 4,032 bales during the peak would have capacity to handle satisfactorily only 6,200 bales during a season.

From these relationships was developed a formula for determining the approximate

maximum satisfactory seasonal capacity of gins where cotton is harvested with machines:

24 × hourly capacity of gin × 21 peak days × 0.80 (percent) ÷ 0.65 (percent) = seasonal capacity.

Of the 22 gins for which managers gave estimated maximum seasonal volumes that their gins could handle satisfactorily, the total seasonal capacities as found by the above formula were 99.8 percent of the total reported by the managers. It was likely an accident that these capacities were that close, but this formula appears to give a practical approximation of seasonal capacities.

Irregularity of delivery of cotton during peak periods, some low-volume days in peak periods, and pressure of growers for trailers to be emptied within 24 hours or less after delivery forces gins to operate below potential capacities even during peak periods. For example, if a 10-bale-an-hour gin operated at potential capacity, it could gin 6,000 bales in 25 days or about as much as it can now handle satisfactorily in a season when ginning for growers.

Labor Problems and Costs

Seasonality and ginning for growers also cause labor problems. The study showed that gin labor in Arkansas averaged $1.75 an hour, including ginners' pay, workmen's compensation insurance, and the gin's portion of social security payments. The unweighted cost of gin labor for the 24 gins was $5.11 a bale (table 3), indicating 2.9 hours labor a bale.

Hours of labor per bale were lower for low-capacity gins than high-capacity gins on volumes of 2,000 to 3,000 bales and also on volumes of over 3,000 bales, (table 3). This is contrary to what might be expected, since some ginners indicated that installation of high-capacity gin machinery was a way of reducing labor and ginning costs. But it corresponds to the relation shown in figure 2 and the previous discussion of total costs of high- and low-capacity gins.

As mentioned earlier, conventional gins need volumes close to their seasonal capacities to secure low costs and these high-capacity gins had inadequate volumes in 1968. Low-capacity gins with volumes of less than 2,000 bales used the most labor per bale but they need to be consolidated.

In collecting data during the interviews on the number of men in gin crews during the peak period, officeworkers and truck drivers were excluded. There was an approximate ratio of 1.1 men per bale of gin capacity an hour. For example, a gin with a 7-bale capacity would likely have 7 men per shift or crew during peak periods. When these gins were operating at capacity, they required 1.1 man-hours of operating labor a bale.

The weighted cost of gin labor is better for comparisons with other methods of ginning than the unweighted cost. The weighted cost of $4.77 a bale for labor indicates the 24 gins used an average of 2.73 hours a bale. Average use of 2.73

Table 3.—Average and range of man-hours of labor per bale by capacities of gins average bales ginned, and average cost of labor per bale, 24 Arkansas cooperative gins, 1968

Ranges in bales ginned by gin capacities	Labor per bale		Average bales ginned	Average cost per bale for labor
	Average	Range		
	Hours	*Hours*	*Number*	*Dollars*
Average of 24 gins	2.90	1.41 - 5.74	2,414	5.11
3,001 or more bales:				
High-capacity gins	2.46	2.20 - 2.91	3,692	4.35
Low-capacity gins	1.76	1.41 - 2.19	3,446	3.11
2,001 to 3,000 bales:				
High-capacity gin	3.10	2.49 - 4.22	2,471	5.14
Low-capacity gin	2.06	1.93 - 2.23	2,437	3.33
1,001 to 2,000 bales:				
High-capacity gins	None	---	---	---
Low-capacity gins	3.60	2.51 - 5.74	1,558	6.53
Average of all volumes:				
High-capacity (8 gins)	2.78	2.20 - 4.22	3,082	4.75
Low-capacity (16 gins)	2.96	1.41 - 5.74	2,080	5.29

hours a bale and requirements at capacity rates of 1.10 hours a bale indicate an average of 1.63 hours of labor a bale were lost by the gins under the method followed on the 1968 crop. And 1.63 hours at $1.75 an hour equals $2.85 a bale lost on idle labor waiting for cotton to arrive.

The cost of labor per bale for the consolidated gins (as explained later) was $3.93 a bale or about 2.25 hours a bale. So about half of that labor was lost, but it was less per bale than by the 24 gins.

The above analysis does not indicate inefficiency in use of labor, but inherent weakness in the present method of ginning cotton for growers. Gin managers have to keep the workers on payrolls so they will be there to gin the cotton when growers bring it to the gins.

Depreciation and Utility Costs

Unweighted depreciation costs of the 24 cooperative gins averaged $4.15 a bale, only about $1 a bale less than the cost of labor (table 2).

Larger volumes reduce depreciation proportionally to the bales involved. However, depreciation remains a substantial item of cost to modern gins with volumes they can handle satisfactorily, because of the seasonality of cotton harvesting and the low ceiling on volumes when ginning cotton for growers under the present method.

Utility costs, especially for electric power, are also substantial items of gin cost. Some electric power rates on gins may be unduly high, but the seasonality of gin operations makes gin power more expensive for electric power companies to supply per unit than power for cottonseed oil mills or other less seasonal operations.

Suggested Improvements in the Present Method

Analysis of the costs and related factors of the 24 gins provides bases for suggesting two improvements in the present ginning method. The analysis showed wide variations in costs between gins with similar capacities and volumes. So the first suggestion is for boards of directors and gin managers to obtain firmer control of ginning costs where they seem higher than necessary or higher than those for similar gins.

Second, the cost curves in figures 1 and 2 indicate that gins with inadequate volumes should consolidate.

Assuming Control of High Gin Costs

With the data on costs of the 24 cooperative gins, coded cost comparisons of the 10 items were made, as in table 2, for each of the 24 gins. Copies were sent to the gin managers and directors, who could compare their gin costs with those of other gins.

Numerous examples can be found in the costs of these 24 gins where one or more items of cost were apparently excessively high. For example, a gin coded No. 25 in the cost comparisons had a total cost of over $36 a bale; a labor cost of $9.83 and depreciation of $11.24. The manager's salary averaged $4.40 a bale, compared with the average of $1.45. The labor cost was over twice that of the other four gins with volumes in the same range of 1,000 to 1,500 bales, and depreciation was nearly three times the average for the 24 gins. It may be very difficult to reduce the total depreciation, once a gin is built, but with costs like this gin had in 1968, the directors and manager urgently need to reduce costs. They may have to sell the gin or consolidate, as they cannot hope to continue operations with costs equal to nearly twice their revenues.

Other examples of high costs were also common. The gin coded No. 8 had office salaries of $2.26 a bale or almost three times the average of 78¢ for the 24 gins. That gin's insurance cost also appeared excessive at $2.14 a bale, compared with an average of 75¢. Gin No. 3 had a labor cost of $5.03 a bale—nearly as high as the average of $5.11 for the 24 gins, although it ginned about 1,500 more bales than the 24 gins averaged. Its labor cost was substantially higher than other gins with over 2,500-bale volumes.

All costs need to be kept as low as practical, even the miscellaneous and other smaller items. For example, gin No. 5 had other costs of $3.94 a bale, over twice the average of $1.42 for the 24 gins. Telephone costs appeared excessive at some gins.

Consolidating Co-op Gins

In figure 1, the average cost curve shows about $5 a bale lower cost for gins with 4,000-bale volumes than for 2,000-bale volumes. The average cost curves in figure 2 show similar differences.

There were no consolidated cooperative gins. However, consolidation had been discussed at some gins and some plans had been made for it in a few cases. The procedure generally would be to close a few local low-volume gins, and

combine their operations in one. All cooperative members of the shutdown gins would associate with the remaining one.

The largest volumes ginned in 1968 were similar to those expected if the gins should consolidate. Costs for these large-volume gins would likely be similar to those for consolidated gins, except that some growers using the latter would incur some additional cost for hauling the cotton further.

To obtain estimated costs for a consolidated operation, the items and the total costs of the seven single-battery gins with the largest volumes were added; then the totals were divided by all the bales the seven gins processed from the 1968 crop. Allowing $1 a bale on one-third of the bales (or 33¢ a bale on total bales) for hauling the seed cotton further to consolidated gins, the additional cost was estimated at 10¢ a bale per mile. The results of the calculations are shown in table 4.

Table 4.—Estimated costs per bale for consolidated Arkansas cooperative gins, 1968[1]

Item	Average cost per bale
	Dollars
Managers' salaries	0.67
Office salaries	0.97
Gin labor (operating)	3.93
Utilities	1.44
Repairs and supplies (including repair labor)	1.13
Bagging and ties	2.65
Depreciation	2.91
Taxes (property)	0.23
Insurance (property)	0.65
Other (telephone, office supplies, auditing, travel, etc.)	1.75
Total ginning cost	16.33
Additional hauling cost	0.33
Total cost	16.66

[1] Weighted costs for 7 single-battery gins with largest volumes in survey.

According to table 4, consolidation would reduce the weighted costs of the 24 gins from $18.33 a bale by $2.17 to $16.66. The 24 gins averaged 2,414 bales, while the seven gins used for consolidated costs averaged 3,490 bales, or slightly over 1,000 bales more per gin.

The nine cooperative gins with volumes under 2,000 bales had average weighted costs of $24.26 a bale and average volumes of 1,509 bales per gin. Costs of consolidated gins were about $7.50 less per bale. This explains why gins with less than 2,000-bale volumes need to be consolidated. Consolidation offers much larger reductions in costs for gins with low volumes. In fact, consolidation would not benefit gins with volumes near their seasonal capacities.

Some problems will arise in accomplishing consolidation, but they could likely be overcome if growers study the economic facts and relationships.

Some gin managers and directors indicated that hauling cotton further was a barrier to consolidation. While it is a barrier, it should not be overemphasized, and it may be overcome.

Thirty gin managers estimated that distances cotton was hauled to their gins averaged about 5 miles, and ranged from 1.5 to 10 miles. Twenty-nine also reported the longest distances cotton was brought to their gins ranged from 3 to 20 miles and averaged 12 miles. The distances between cooperative gins ranged from those located in the same town to over 25 miles, but most of them were less than 15 miles from one or more other gins and many were within 10 miles or less of at least one other gin.

Data on costs of hauling were not collected during the interviews in Arkansas, but data on methods were obtained. Managers of 30 gins estimated that about 84 percent of the cotton was pulled to gins by pickup trucks, mostly ½-ton size, and about 15 percent was brought to gins with tractors. Practically all growers used trailers which ranged from 1- to 10-bale sizes. The most common was the 4-bale size, which transported nearly half of the total cotton.

In an earlier Oklahoma study, data were collected on hauling costs (9, pp. 21, 22, and 34). Estimated costs for ½-ton pickups with 2-bale trailers in Oklahoma were 10 cents a bale per additional mile, one way, including the wages of the pickup driver. Costs in Arkansas should be somewhat less per bale because of more level roads, less seed cotton per bale, and hauling more bales per load. Machine-picked cotton in Arkansas weighs about 750 pounds less per bale than machine-stripped cotton in Oklahoma (10). The 33 cents per bale used for hauling to consolidated gins in table 4 appears adequate to cover additional costs.

Gins involved in consolidation may find it desirable to pay all grower members an allowance of 10 cents a bale per mile or some other amount that is equitable on all cotton brought to the gin. If this allowance corresponds to the average cost or slightly more, it would have the effect of removing distance of hauling as a factor, up to the maximum distance it pays for growers to haul seed cotton.

Community pride and sentiment are sometimes barriers to gin consolidations.

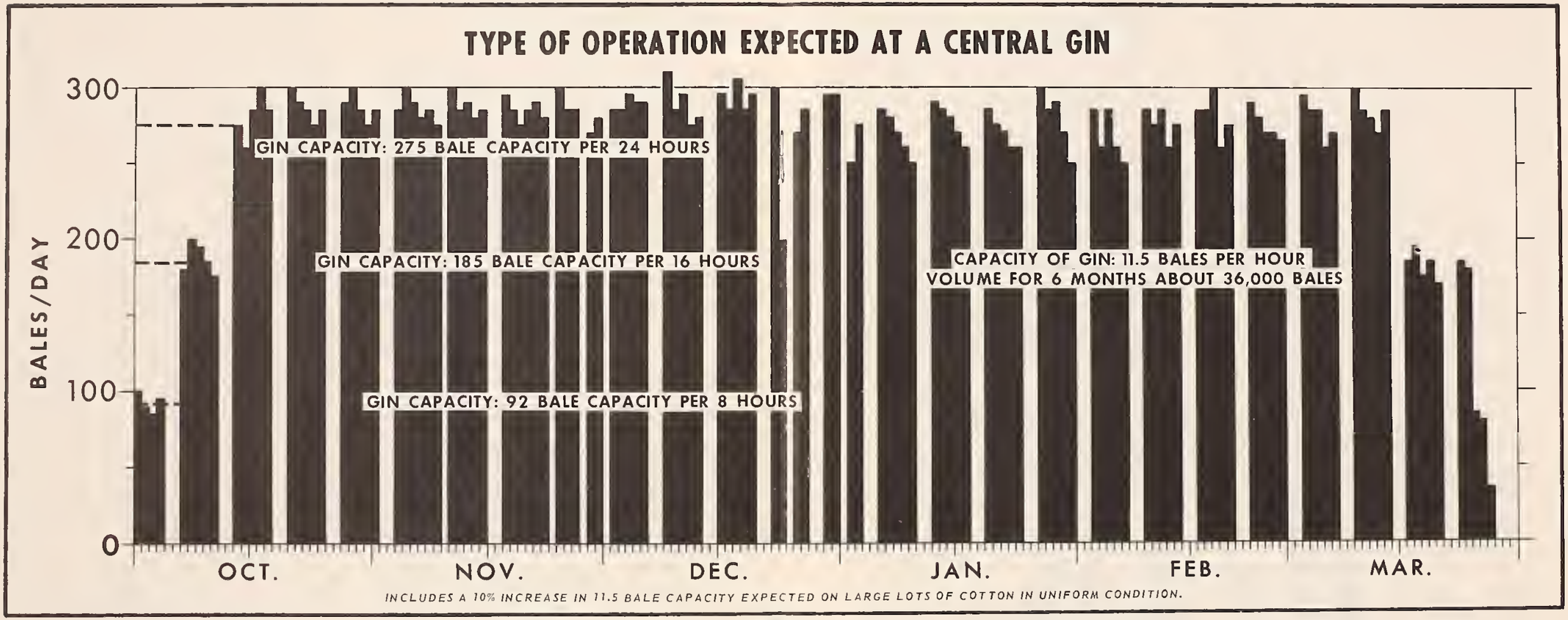
TYPE OF OPERATION EXPECTED AT A CENTRAL GIN
BALES/DAY
300
200
100
0
GIN CAPACITY: 275 BALE CAPACITY PER 24 HOURS
GIN CAPACITY: 185 BALE CAPACITY PER 16 HOURS
GIN CAPACITY: 92 BALE CAPACITY PER 8 HOURS
CAPACITY OF GIN: 11.5 BALES PER HOUR
VOLUME FOR 6 MONTHS ABOUT 36,000 BALES
OCT.
NOV.
DEC.
JAN.
FEB.
MAR.
INCLUDES A 10% INCREASE IN 11.5 BALE CAPACITY EXPECTED ON LARGE LOTS OF COTTON IN UNIFORM CONDITION.

FIGURE 6

Growers can compare costs and savings and decide if it pays to consolidate gins.

The most practical way to consolidate gins is to dismantle and sell surplus gins with low volumes, and for their members to join other cooperative gins and haul their cotton to them. Many gins have been getting volumes below their seasonal capacities and will welcome additional cotton. Only a fraction of book values will probably be realized for some dismantled gins, but they are a costly convenience now. After paying the cost of hauling cotton further to the remaining gins, substantial savings should be obtained from an economic number of gins. For further discussion of gin consolidation, see (9, pp. 18 through 24).

Problems of Conventional Gins

A common explanation of why cotton growers want their cotton ginned about as fast as they harvest it is that they can sell it and pay their creditors. But that explanation has apparently been partly if not entirely incorrect for some time. For example, less than half of the U. S. cotton ginned in October 1967 was sold in that month (fig. 4). Forty-one percent of the 1967 crop was ginned in November but only 26 percent of it was sold in November.

Cotton consumption by U.S. textile mills was rather stable and ranged between 7 and 10 percent per month for the 1967-68 crop year (fig.4). This means that a large part of the bales must be stored for some time after ginning before mills use them.

The percentages of cotton ginned, sold, and consumed by mills have been similar to those for the 1967 crop year for several years (11, pp. 98, 104, and 142). Data for Arkansas indicate similar relationships of percentages ginned and sold though both were more concetrated in October and November. Mill consumption data for Arkansas cotton were not available.

Growers sell most of their cottonseed to ginners at the time the cotton is ginned. And ginners usually sell the cottonseed about as fast as truckloads accumulate. Consequently percentages of oil mill receipts by months lagged behind ginnings slightly in September and October of 1967 (fig. 5). Receipts nearly equaled ginnings in November and exceeded ginnings in December. But percentages of the cottonseed crushed were less than half of receipts during October and November. Oil mill operations tended to be concentrated somewhat

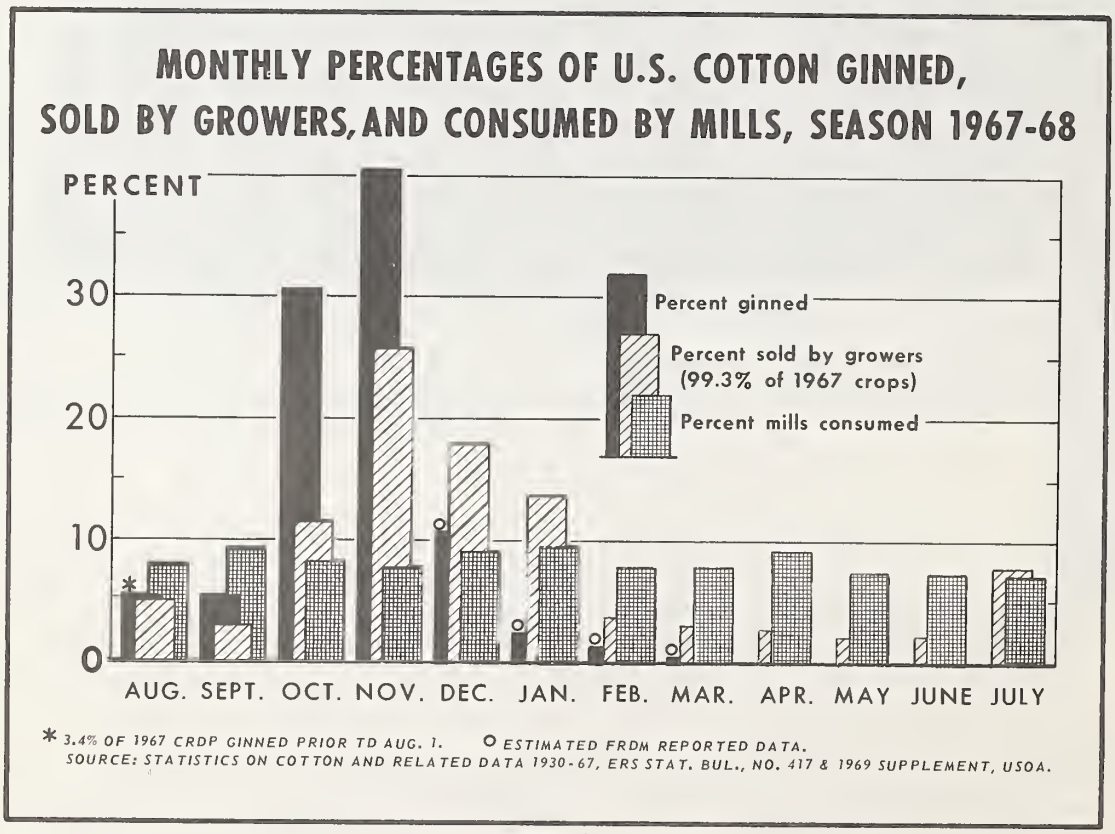

FIGURE 4

over 6½ months but some crushing operations occur in all 12 months. The excess of receipts over crushings at oil mills also resulted in a large part of the cottonseed being stored for some time before the oil mills needed the seed (fig. 5).

Central gins, described in the following section of the report, could gin 10 to 15 percent of the cotton per month and supply the cotton to textile mills and cottonseed to oil mills as the mills need the cotton and seed (fig. 4 and 5). That would result in storage of seed cotton, as in many foreign countries, and discontinued or greatly reduced storage of baled cotton and cottonseed.

Although many growers usually have enough trailers to hold the cotton harvested in a day, if the trailers are not emptied as they need them during the second and later days, delays result. If additional trailers are bought and trailers are used for storage, trailer costs rise rapidly.

The annual costs of 4-bale trailers (for machine-picked cotton) probably average $100 a year. If 10 loads of 4 bales or 40 bales are hauled, the trailer cost averages about $2.50 a bale but if the trailer is tied up for storing seed cotton half the time and it is used to haul only 5 loads or 20 bales a season, the trailer cost goes to $5 a bale, plus additional investments and risk.

Ginning cotton for growers is an exceptionally well established custom. Most growers accept it without questioning its efficiency or equity. Many have excessive confidence in this method. Weights of cottonseed are now estimated on a large portion of the crop with many errors in the estimates. Cotton quality is determined from small samples that may not be representative. The present system is imperfect in several respects.

Ginning cotton for growers causes many problems of the present gins, including low ceilings on volumes (limited to the equivalent of a month's operation or less), high depreciation, seasonal operation (limited to harvesting periods), idle labor while waiting for cotton to arrive, high power costs, and others. These problems apply to all of the present cooperative gins, including those that receive as much cotton as they can gin and keep members satisfied, but these problems are more serious for gins with lower volumes.

Experience has convinced most cotton growers that it is not practical to store cotton on the stalks by leaving it past the optimum time for harvesting. This applies even when they own the gins and extending the use of gins would lower their gin costs. Grades decline, stalks become brittle (making it more difficult to

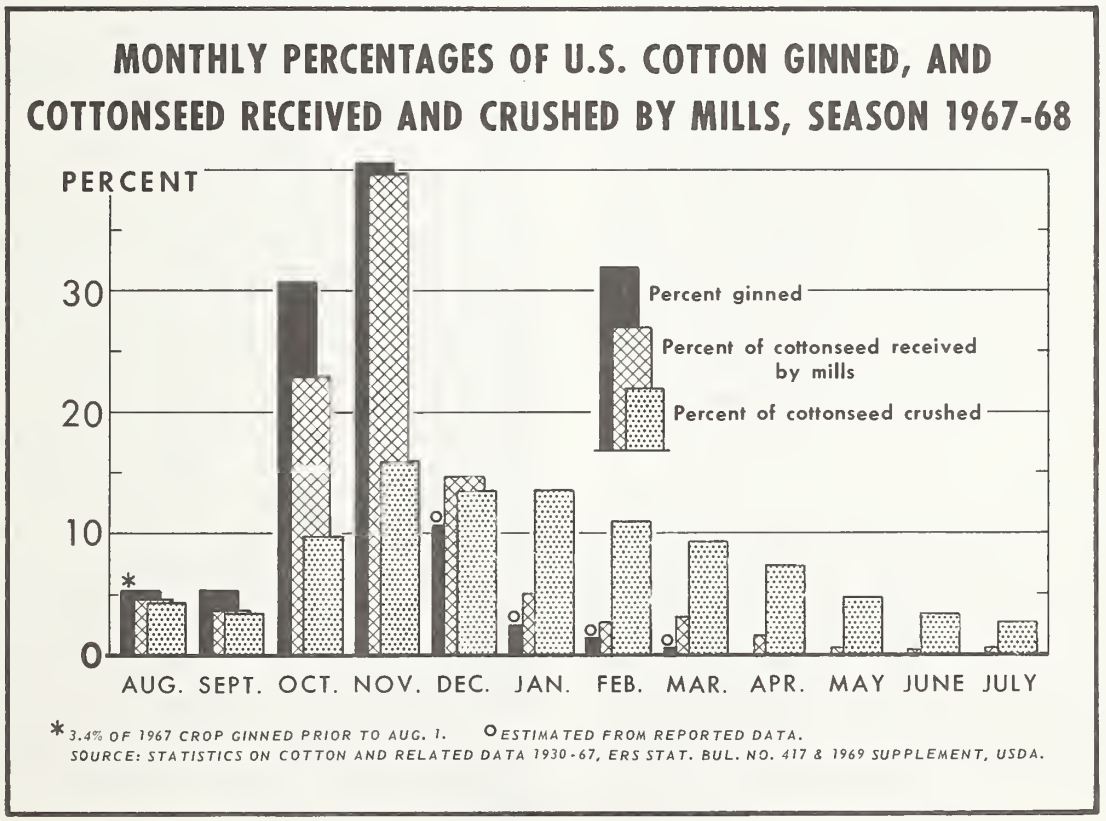

FIGURE 5

harvest the cotton), and the cotton may even be destroyed by storms.

Storage of harvested seed cotton on farms has not been acceptable to cotton growers. During the late 1940's and early 1950's, and especially in 1949, considerable amounts of seed cotton were stored on the ground, in fields, in the Lubbock area of Texas. Large crops exceeded the ginning capacity in the area at that time. Research workers recommended field storage of machine-stripped cotton as a satisfactory method of adapting gin capacity in that area to mechanical harvesting (24). But growers built additional cooperative gins and others also built gins so that growers would not have to store seed cotton in fields. Even though the new gins were larger and had higher capacities, especially after the late 1950's, active gins have not yet equaled the 1949 average volume per active gin of 7,500 bales in Lubbock County (2). Neither have gins in some of the other Plains counties equaled their 1949 average of bales per active gin.

A 1950 survey of Oklahoma growers showed that they did not consider it practical to store seed cotton on farms because of (1) lack of suitable buildings; (2) additional labor required; (3) additional handling and transportation; (4) extra risks of fire; and (5) risks of damage to quality (4). The actions of the Texas growers indicated they agreed with the views of Oklahoma growers.

Because over 99 percent of the cotton in this country is now ginned for growers, generally only remnants—amounts too small to make a bale left over when harvesting is completed—are sold to ginners as seed cotton. There are a few exceptions, especially in Virginia and eastern Oklahoma. Under these conditions it is easy to overlook the possibility that there may be other ways or methods of marketing and ginning cotton. The limitations and weaknesses of ginning cotton for growers indicate that alternative methods need to be studied, tested, and used here, if found better and less costly.

New Problems

In recent years a new labor problem has developed. Gin managers find it increasingly difficult or almost impossible to hire night crews for the peak periods because of the short time the work lasts. Some managers have problems hiring full day crews because day work is also seasonal. Some gins operate only one shift a day. This substantially reduces the seasonal capacities and volumes gins can handle satisfactorily and further increases the cost of ginning cotton for growers.

Broadcast or narrow row cotton is a promising new development in cotton production now in the experimental or pilot stage. If it proves successful, it will present conventional gins with a major problem. Harvesting machines suited to that type of cotton harvest it more than twice as fast as the present machines. They will harvest the crop in a much shorter time and cause even shorter gin seasons, if cotton is ginned for growers as fast as they harvest it. Such a development will increase the need for central ginning.

Alternative Methods of Ginning Cotton

Reviews of reports on marketing and ginning of cotton in foreign countries showed that most growers in foreign countries sell most of their cotton as seed cotton (8, pp. 3-5). An estimated 90 percent of the 1965 foreign crop was sold as seed cotton. An estimated 85 percent of the cotton sold by growers as seed cotton that year was ginnned by central gins. So about 75 percent of foreign cotton or more than half of the world crop was ginned by the central method.

Central ginning consists of cooperatives, cotton merchants, or others buying enough seed cotton directly or indirectly from growers during the harvesting season to keep gins operating at capacity rates for several months a year.

From 1928 to 1932, about three-fourths of the cotton in northeastern Arkansas, eastern Oklahoma, southeastern Missouri, and western Tennessee was sold as seed cotton (17, pp. 3 and 4). Research workers studied the sales of seed cotton and found some important advantages in this practice (17, p. 22), (12, pp. 62-64), and (16, pp. 19-27). Among the advantages were (1) minimized delays in unloading at gins during the rush part of the season when farmers' time was in greatest demand; (2) ginners could flatten out the peak load by extending the ginning period; (3) a tendency to reduce ginning costs; (4) use as a means of increasing volumes; and (5) as a rule, higher prices were paid for cotton in the seed than for cotton purchased in bales.

Among disadvantages reported by these researchers on sales of seed cotton were that it (1) encouraged growers to use varieties yielding large quantities of seed cotton, regardless of other important considerations; (2) encouraged poor care in harvesting and handling by growers; (3) encouraged payment of the same price for all cotton at a gin, regardless of differences in

quality and (4) increased risks to ginners on quality of cotton since the cotton was not classed. Neither was lint turnout known.

The sales of seed cotton in the United States did not result in central ginning. The gins' operations were commonly mixtures of ginning some cotton for growers and buying some seed cotton with proportions varying from year to year. Gins were numerous and sufficient quantities of seed cotton were not accumulated to operate gins much longer than when ginning for growers. Loan rates higher than market prices apparently caused the sale of seed cotton to practically cease in the late 1940's and 1950's.

The widespread use of the central method of ginning in foreign countries shows it is practical in those countries. Most of the disadvantages found by research workers in this country during the 1930's to sales of cotton as seed cotton would be overcome or eliminated by analyzing representative samples of the seed cotton for turnouts and quality of the lint. This can be done. A major question of concern in this study is: Would it be worthwhile to change to central ginning?

Cost Comparisons

Whether growers should change to central ginning depends on comparative costs of the conventional and central methods of ginning and on other advantages and disadvantages of each method.

Previously projected costs for central gins in Texas and Oklahoma (7), (8, pp. 5-11), and (9, pp. 26-29), were based on data from surveys to the extent data were available and estimates were made to complete the projected or estimated costs. These projections showed substantial savings of $5 or more a bale for central gins over conventional gins. Furthermore, investments were much lower for central gins and central gins could blend cotton into uniform lots.

Projected costs were developed for central gins with receiving stations in Arkansas by adjusting previous projections to Arkansas conditions and a more recent date. Projections for central gins not using receiving stations were also made, but those projects are restricted for lack of information on additional costs to growers, if any, for the harvesting method assumed for such gins.

Projected costs for central gins, with and without receiving stations, and weighted costs for the 24 cooperative gins and the consolidated gins are included in table 5. Additional hauling costs were included for the consolidated and central gins.

Central gins are expected to use high-density gin presses, which would largely eliminate compression costs. But they would have storage costs for seed cotton. Storage and compression costs for all types of gins were included in table 5 so as to make the comparisons more complete. For details on how the storage costs were developed for Texas see (8, pp. 41-44).

The total costs including interest on investment shown in table 5 for consolidated gins were about $2.40 a bale below the costs for the 24 gins. The projected costs for the central gin with receiving stations were $5 a bale less than for the consolidated gins and $7.40 a bale lower than for the 24 gins. Costs per bale for a central gin without receiving stations were over $12 lower than for the 24 gins.

The costs in table 5 did not include any allowance for the increase in value of cotton that may result from better conditioning, better ginning, and blending at central gins. These improvements may be worth $1 to $5 a bale in higher sales prices for West Texas cotton. These improvements may prove to be substantially more important than savings on ginning costs, if they improve the competitive position of centrally ginned cotton so that mills buy it when otherwise they would use foreign cotton or synthetic fibers.

Figure 6 (pp. 10-11) illustrates the type of operations expected at central gins. Ginning would start as soon as enough cotton is accumulated to operate the gins at capacity for 8 hours or one shift. Additional shifts would be added when enough additional cotton accumulated. Then during November and December the gins might operate on part or all of the weekends as well as three 8-hour shifts during week days, if necessary to supply the demands of mills or to reduce the storage space requirements. Overtime work could be used for weekends.

A comparison of figures 3 and 6 indicates why labor, depreciation, and utility costs are much lower for central gins than for the 24 cooperative gins or even consolidated gins. The gins in figures 3 and 6 had the same capacity of 10.5 bales per hour as measured by number and size of saws and stands. A 10-percent increase in the hourly capacity (from 10.5 to 11.55 bales) was used for the central gin because it is expected to result from ginning large lots of 100 or more bales, more uniform condition of cotton, and no loss from slowing down between lots of cotton from different growers. The major differences accounting for 36,000 bales for the

Table 5.—Average costs per bale for ginning and related items for 24 cooperative gins, consolidated cooperative gins, and cooperative central gins in Arkansas, 1968

Item	Average cost per bale, 24 gins averaging 2,414 bales[1]	Estimated costs for consolidated gins averaging 3,490 bales[2]	Estimated costs per bale for central gins on 36,000 bales[3]	
			With receiving stations	Without receiving stations
	Dollars			
Managers' salaries	1.18	0.67	0.50	0.50
Office salaries	0.79	0.97	0.50	0.50
Gin labor (operating)	4.77	3.93	1.60	1.60
Utilities	1.74	1.44	1.00	1.00
Repairs and supplies (includes repair labor)	1.41	1.13	0.75	0.75
Bagging and ties	2.65	2.65	2.50	2.50
Depreciation	3.82	2.91	0.75	0.75
Taxes (property)	0.33	0.23	0.10	0.10
Insurance (property)	0.66	0.65	0.20	0.20
Other (telephone, office supplies, auditing, travel, meetings, etc.)	1.48	1.75	1.10	1.10
Total average ginning cost	18.83	16.33	9.00	9.00
Estimated receiving station costs	None	None	5.00	None
Additional hauling cost	None	[4]0.33	0.25	0.25
Analysis of seed cotton samples	None	None	0.25	0.25
Estimated costs for storage and compression to March 31	4.25	4.25	3.50	3.50
Total ginning, storage and compression costs	23.08	20.91	18.00	13.00
Interest on ½ of original investment at 7.5%[5]	3.11	2.89	0.78	0.42
Totals, including interest	26.19	23.80	18.78	[6]13.42

[1] Calculated by adding total costs of 24 gins for items and dividing those totals by the 57,925 bales they ginned, or an average 2,414 bales.

[2] Costs were for 7 single-battery gins with largest volumes among 24 in survey. Total costs for 7 were divided by the 24,426 bales they ginned, an average of 3,490 bales.

[3] Estimated costs were developed by taking costs estimated for similar operations in Texas and Oklahoma and adjusting them for Arkansas conditions. See (7), (8), and (9).

[4] It was assumed 1/3 of 3,500 bales were hauled an average of 10 miles further at a cost of $1 per bale, or 33 cents a bale for total bales.

[5] Interest on investments is a return to capital but it is included here because of the substantial differences between the investments required for the different gins.

[6] Projected additional costs to grower, if any, for harvesting method assumed for this gin have not been calculated.

central gin compared with 4,000 bales for the conventional gin was the continuous operation assumed for the central gin and intermittent seasonal operation of the conventional gin when ginning for growers.

A central gin, like that illustrated in figure 6, could gin 36,000 bales in 6 months, with three 8-hour shifts. Or it could gin 36,000 bales in about 9 months with two 8-hour shifts or over 50,000 bales in 9 months with three shifts.

A recent comparison of U.S. and foreign cotton ginning charges shows differences similar to the projected costs (15, p. 11). Many of the gins in the foreign countries included in that comparison were manufactured in the United States. In most of those foreign countries, large proportions of the cotton were sold by growers as seed cotton and centrally ginned. Average bales per U.S. gin for the 1968 crop averaged about 2,600, while bales per gin in 6 of the 8 foreign countries averaged over 10,000 bales per gin. Weighted average gin charges per bale were $18.64 a bale on the 1968 U.S. crop but only $12.24, or $6.40 less a bale, in the foreign countries included in (15).

Investments, Revenues, and Returns

Assets of the 24 cooperative gins averaged $41.42 per bale ginned (table 6). That was about four times as much as the average estimated assets of $10.42 a bale needed for the central gin with receiving stations (table 6). The assets of the consolidated gins averaged $38.57 per bale, or about $3 a bale less than the average for the 24 gins. The estimated assets per bale for the central gin without receiving stations was the lowest of the four gins at $5.56 a bale, but that does not include any allowance for increased investment by growers, if any increase is necessary for this system.

Table 6.—Assets, revenues, costs, net returns, and percentage returns on assets per bale for Arkansas cooperative gins, 1968 crop

Items	Avcrage for 24 co-op gins on 2,414 bales	Estimated average for consolidated gins on 3,500 bales	Estimates for cooperative central gins	
			With 7 receiving stations on 36,000 bales	Without receiving stations on 36,000 bales
	Dollars			
Average assets per bale ginned	41.42	38.57	10.42	5.56
Estimated average revenues per bale:				
Gin charges (advance)	18.50	18.50	18.50	18.50
Estimated gin margin on cottonseed	2.00	2.00	2.00	2.00
Estimated storage and compression cost[1]	4.25	4.25	4.25	4.25
Total estimated revenues including storage and compression costs	24.75	24.75	24.75	24.75
Costs per bale:[2]				
Ginning only	18.83	16.33	9.00	9.00
Receiving station cost	None	None	5.00	None
Additional hauling costs	None	0.33	0.25	0.25
Additional costs for analysis of samples	None	None	0.25	0.25
Costs for storage and compression[3]	4.25	4.25	3.50	3.50
Total cost	23.08	20.91	18.00	13.00
Net revenues (revenues less costs)	1.67	3.84	6.75	[4]11.75
Percent return on assets	4.0	10.0	65.0	[4]

[1]Included as a charge here to equalize gross revenues of different gins for use in calculating net revenue later in table.

[2]From table 1.

[3]The costs for storage and compression are included primarily because of extensive seed cotton storage for central gins and because they have high-density gin presses.

[4]Projected additional costs to grower, if any, for harvesting method assumed for this gin have not been calculated.

Estimated revenues used in table 6 for these comparisons were the same for all the gins. The revenues consisted of the average estimated gin charge of $18.50 a bale, an estimated gin seed margin of $2 a bale, and the estimated storage and compression cost for the 24 cooperative gins of $4.25 a bale, making a total of $24.75 a bale total revenues. The storage and compression cost was included in revenues to simplify comparisons.

Ginning costs in table 6 are the same as in table 5 except interest on investments was included in table 5 but omitted in table 6, since percentage returns on investments are included in table 6.

Estimated net revenues and percent return on assets vary widely in table 6. The average net return on assets of 4 percent for the 24 gins is too low to be satisfactory. Net returns of 10 percent on assets of consolidated gins is close to the borderline, considering the risks involved. The estimated return of 65 percent on the assets of the central gin with receiving stations is very attractive. Returns on assets of central gins without receiving stations may prove to be even more attractive after including all necessary grower investments and costs.

Application of Central Ginning

Some modified procedures and some new procedures and practices will be needed to start central ginning operations. Procedures used in other countries and other operations can be adopted and adjusted for use in central ginning in this country. Modifications may supply most of the requirements. Experiments and pilot plants will be needed to test and prove the new and modified procedures and practices. The major change in practices would be that of growers selling seed cotton rather than lint and seed.

Among the new or modified procedures needed are methods for taking and analyzing seed cotton samples, and practical low-cost ways of baling, handling, storing, conditioning, and blending seed cotton. Sampling theory and practices on other products will provide some information. Some suggestions on sampling, analysis of samples, and other procedures were included in (8). Receiving stations and related matters were also discussed in (8).

Standard items of gin equipment could be used for most of the operations necessary at receiving stations. But more efficient items are

needed if they are available or can be readily adapted and will perform the function. For example, standard gin presses will bale seed cotton. But automatic hay balers or waste-paper balers will apparently bale it faster with less manpower and at lower cost.

Prospects are promising for development of the equipment needed for central gins without receiving stations. Extractors for use on stripper-type harvesters have been developed and field tested. They could be used on picking machines if needed.

Hay balers have been used on seed cotton and on cotton motes. Apparently seed cottom balers, similar to hay balers, can be developed for mounting on cotton harvesters in place of baskets. They need to be low-cost and can be of comparatively low capacity (10 tons or less per hour). Some modifications may be needed. For example, triangular blocks may be needed in corners of bale chambers, on bale plunger, and as dogs at the opposite end of bale chambers to eliminate 90-degree edges of bales. The 90-degree edges of bales of seed cotton tend to be loose and some of the seed cotton falls off. And the openings formed by sloping edges where bales come together would also form ventilating channels in stored bales of seed cotton, for drying or humidification.

Hay bale accumulators have been developed already. If accumulators on harvesters collected and stacked bales of seed cotton at the ends of cotton fields, front-end loaders on farm tractors or loading equipment mounted on trucks could load the cotton on trucks. The trucks could then haul the cotton directly to storage. This system would eliminate the need for both receiving stations and growers' trailers and their costs.

Automatic hay balers could be used in fields with one to several cotton harvesters to bale seed cotton until balers are developed for mounting on harvesters. Only feeding hoppers and other minor modifications would apparently be needed for this use.

For further discussion on application of central ginning see (8, pp. 17-28, and pp. 45-46) and (9, pp. 24-26 and p. 31).

VERTICAL COORDINATION

As in other States, Arkansas cotton growers now operate cooperative cottonseed oil mills and a cooperative warehouse and compress. Two cotton marketing cooperatives also operate in the State.

The data available for use in this study on these cooperatives were very limited, as stated previously. Consequently, the primary data were used that were applicable and secondary data from Arkansas and other States were added to make the following analyses of vertical coordination. These analyses are primarily on savings per bale and return on assets or equities of the cooperatives for the purpose of determining the potential opportunities in these areas for Arkansas cotton growers. Comments generally apply also in most other States.

Cottonseed Oil Milling

Cotton growers have been operating cooperative cottonseed oil mills in the United States for over 50 years (13, p. 1). Apparently the first cooperative oil mill in Arkansas was organized in 1937 (13, p. 2). Other mills were organized in Arkansas in 1942 and 1945 and one in the 1960's.

Financial data for the 1968 crop were available from only one of the cooperative oil mills in Arkansas. Those data were omitted from this study to avoid disclosing that mill's operations. Less recent secondary data on Arkansas cooperative oil mills and other secondary data were used instead.

Arkansas cooperative cottonseed oil mills netted $6.01, $7.61, and $12.77 a ton above the average farm price in the State for the 1957, 1958, and 1959 crops (19, p. 3). For those three crops, these mills averaged $8.80 a ton above the average gin price.

The Oklahoma cooperative cottonseed oil mill completed its 18th year of operation in 1962. Its net savings averaged $7 a ton over that 18-year period (5, p. 11.)

A West Texas cooperative cottonseed oil mill averaged net savings of $6.80 a ton above average farm prices and gin margins on cottonseed for 28 crop years—1936-63 (3, pp. 14 and 19). Another cooperative cottonseed oil mill in Texas averaged $9.83 a ton net returns above open market prices at time of delivery over a 26-year period 1934-59 (25, pp. 46 and 53).

The member equities in the West Texas mill (that made average savings of $6.80 a ton over the 28-year period) averaged $27.06 a ton for the 307,700 tons received from the 1963 crop (3, pp. 14, 19 and 49). Average net returns of

$6.81 a ton above farm prices on $27.06 of equity were equal to net return of 25 percent.

Investments and equities of cotton growers in cooperative cottonseed oil mills vary. For example, member equities of the second Texas oil mill cited above averaged about $14 a ton in 1960 when it crushed about 50,000 tons of cottonseed and made net savings of $9.25 a ton (25, pp. 52 and 53).

Net savings of cooperative cottonseed oil mills vary between areas and by years but they are substantial in amount and as a percentage return on member equities. For the 11 years, 1957-68, savings of several cooperative oil mills, on which data were available, averaged 26 percent return on the equities of their members (20, p. 16). During the period, average savings as a percentage return on equities ranged from 14 percent on the 1966 crop to 41 percent on the 1965 crop.

Warehousing and Compressing

Following baling at gins and short-term storage on gin yards or under gin sheds, most cotton bales are trucked to warehouses, which usually have a compress, especially those near and west of the Mississippi River. The length of time bales are stored in warehouses varies widely, but most of the bales are compressed before they are shipped from warehouses that have a compress.

Cooperative warehouses with compresses have been organized to assure storage space for members' Government loan cotton, for cotton handled by cotton marketing cooperatives, and to save part of charges made by commercial warehouse and compress services. There are now several cooperative warehouses with compresses in Mississippi and in most of the cotton States west of the Mississippi River, and one in Arkansas.

On 22 crops, 1947-68, the Arkansas cooperative warehouse and compress had net earnings of nearly $3.4 million. In the early 1960's, that cooperative had net earnings of about $2 a bale and the net earnings equaled a return of 20 to 25 percent on member equities. Cash refunds were often over $1 a bale in the early 1960's. Lower cotton production in the area it serves and lower volumes have caused lower net savings in the later 1960's.

One cooperative warehouse and compress in West Texas averaged net savings of $2.08 a bale on 16 crops, 1948-63 (3, p. 24). Net savings on the 1963 crop of $3 a bale at that cooperative were equal to 38 percent return on the average member equity that year of $7.90 a bale. The average saving of $2.08 a bale for the 16 years equaled a return of 26 percent on an equity of $7.90 a bale.

Another cooperative warehouse and compress in Texas averaged net savings of $1.89 a bale on 11 crops, 1953-63 (3, p. 31). Member equities on the 1963 crop averaged $12.22 a bale. Net savings on that crop averaged $2.98 a bale, which would equal a return of 24 percent on an average equity of $12.22. The average net savings of $1.89 a bale for the 11 crops would equal a return of 15 percent on an average equity of $12.22.

Cotton Marketing

Information on operations of cotton marketing cooperatives is more limited and often less definite than on other kinds of cotton cooperatives. Unless these kinds of cooperatives advance prevailing market prices for the various qualities of cotton at time of delivery or keep records of prevailing prices at the time cotton is delivered to them, net savings are difficult or impossible to determine the way other net savings are determined. The financial data used in this study was published in (3).

A West Texas marketing cooperative averaged net savings of about $1.30 a bale for 11 crops during 1953-63 (3, pp. 39-40). Members' equity per bale handled from the 1963 crop averaged $4.09 a bale and savings for that crop averaged $1.09 a bale. The saving on that crop equaled a return of nearly 27 percent on the member equities. The average savings of $1.30 a bale for the 11 years would equal nearly 32 percent return on the average 1963 equity of $4.09.

TEXTILE MANUFACTURING AND MARKETING

In the winter and early spring of 1969, many cotton growers in Arkansas and nearby States and some other people in the area were unusually interested in the potentialities of cotton growers cooperatively processing and marketing cotton through cotton mills and even possibly retailing some of the products. The poor demand for raw cotton and the scarcity or

absence of all-cotton products in some stores contributed to and supported these discussions.

Relationships, competition, costs, facilities, margins, and suggestions for improvements such as reductions in costs of the textile industry were reported in (18). That report states "... from 1935 to 1962 returns to farm producers for cotton used amounted, on the average, to about 15 percent of the consumer's dollar. Marketing margins amounted to 85 percent of the consumer's dollar...". Since 1962, changes in distribution of the consumer's dollar has probably resulted in a lower percentage going to cotton growers. The above quotation and the probable decline in percentage of consumer's dollar going to growers together with scarcity or absence of all-cotton goods in stores seems to explain growers' unusual concern and interest in the efficiency and operations of the textile industry beyond the sale of baled lint.

Cooperative processing and marketing of cotton products by growers beyond baled lint would be an entirely new activity in this country. But if cotton goods are scarce or absent from retail stores, cotton growers need to know what they can do about it. Some growers have cooperated in opening an all-cotton store (22, p. 58).

Cotton growers need to explore further processing and marketing objectively. If growers should acquire textile mills and market the products cooperatively, that does not necessarily mean that because they own the cotton they can sell cotton products to consumers at lower prices or make large net savings. But cotton growers do have interests in these operations and there may be opportunities to protect these interests through cooperative action, if they choose the correct facilities and get good or excellent management.

The following brief discussion reports the findings of a limited investigation of the returns on net worths and capital requirements of firms operating textile mills and marketing textile products beyond the cotton bale stage. A few other related factors are also discussed briefly.

Returns From Further Processing and Marketing

Some 65 to 70 textile manufacturers averaged 7.1 to 12.3 percent return on their net worths, according to book values and after income taxes for the 6 years 1963-68 (table 7). Some of the firms likely processed wool and synthetic fibers; some may have processed cotton only, and others may have processed all three kinds of fibers. For the 6-year period, those manufacturers averaged 9.7 percent net returns on net worths after taxes. Net worths according to book values and market values of a firm's stocks are often substantially different.

Clothing and apparel manufacturers made average net returns of 12.0 to 16.3 percent a year on their net worths after income taxes

Table 7.–Percentage return on net worth after taxes of selected business groups, 1963-68[1]

Type of business	Unit	1963	1964	1965	1966	1967	1968	6-year average
Textile manufacturers:								
Companies included	No.	70	70	70	67	65	65	68
Return on net worth	Pct.	7.1	9.0	11.6	12.3	8.8	9.6	9.7
Clothing and apparel manufacturers:								
Companies included	No.	91	91	85	81	85	85	86
Return on net worth	Pct.	12.0	13.0	16.3	16.2	13.6	15.3	14.4
Department and specialty stores:								
Companies included	No.	80	80	66	69	74	74	74
Return on net worth	Pct.	9.9	11.9	13.6	13.5	13.0	13.3	12.6
Mail-order firms:								
Companies included	No.	13	13	9	8	7	7	9
Return on net worth	Pct.	11.9	13.0	2.9	13.5	13.4	12.4	12.8
Grand total:								
Comapnies included	No.	3,945	3,945	3,850	3,867	3,928	3,928	3,910
Return on net worth	Pct.	9.7	10.3	11.1	11.3	10.6	10.6	10.6

[1] Based on book values of net worth–not current market values of stocks or other securities.

Source: Monthly Economic Letters, published by First National City Bank, 399 Park Avenue, New York, N.Y. 10022. Letters for April of years 1965, 1967, 1968, and 1969, or (14).

during 1963-68, (table 7). They averaged 14.4 percent for the 6 years. Some of these firms used wool blends and synthetics, as well as cotton.

Department and specialty stores and mail-order firms sell other goods such as household appliances and furniture, along with clothing. The clothing they handle is made of wool, synthetics, and blends, as well as cotton. Department and specialty stores averaged from 9.9 to 13.8 percent net returns on equities after taxes for 1963-68 (table 7). They averaged 12.6 percent over the 6-year period. The mail-order firms averaged from 11.9 to 13.5 percent return on net worth during the same 6 years and averaged 12.8 percent return on book values for the period (table 7).

Nearly 4,000 companies were included in the reports used as the source for table 7 (14). The net returns of all the companies included ranged from 9.7 to 11.3 percent during 1963-68 and averaged 10.6 percent.

Average returns for the 6 years were 0.9 percent lower for the textile manufacturers than for the total of all companies. But the textile manufacturers made higher returns than some of the other groups. And the other groups handling textiles had higher average returns for the 6 years than all the companies averaged.

Data were not available in (14) on incomes before income taxes.

Returns on Equities and Other Financial Relationships of Textile Mills

If cotton growers should get into processing and marketing of cotton beyond the baled lint stage, spinning and weaving would likely be included regardless of whether further steps were taken. Bleaching, dyeing, and finishing might be included. Net returns and capital requirements of mill firms operating in these areas were investigated in more detail than returns of firms handling clothing, apparel, and retailing of cotton products.

Financial statements of 25 and 28 textile mill firms were selected for analysis of their financial reports for the 5 years from 1963 through 1967 from (1). Reports were not available on 1 and 3 of the 28 firms for some of the years in that period.

Net worths, as reported in the annual financial statements, were used in calculating percentage returns. The selected mill firms processed cotton, but some of them also process wool and synthetics. Most of them spun fibers or wove cloth and some also bleached, dyed, and finished cloth. A few also made clothing, but spinning and weaving accounted for most of their activities.

The average percentage return of the 25 to 28 mill firms on equities or net worths before income taxes was 17.0 percent for the 5 years, 1963-67 (table 8). Average returns, by years, ranged from 14.7 to 20.3 percent on book value of net worths. Returns of the individual mill firms ranged from a loss of 7.9 percent to a net return of 31.0 percent. The loss was by one firm in 1 year and that firm made net returns during the other 4 years of the 5-year period.

The net returns of the 25 to 28 mills after income tax averaged 9.0 percent for the 5 years. That was slightly over half of the rate of return before taxes. Those mills averaged from 6.8 to 11.1 percentage returns during the individual years. The range in returns of the individual firms during 1963-67 after income taxes was from the loss of 7.9 percent by the one mill in one year to a return of 16.3 percent on net worth.

Investments and Equities in Textile Mills

Total assets of 25 to 28 mills averaged nearly $149 million per mill for the 5-year period (table 8). Their assets increased by nearly 50 percent from 1963 to 1967. The range in total assets was from less than $1 million to over $1 billion. Inspection of the data for individual mills showed less than half or about 10 of the 25 firms had over $100 million in assets.

The equities of the owners in the firms averaged about 60 percent of the total mill assets. Equities ranged from 23 to 95 percent of the total assets of the mills (table 8).

Both average assets and average equities in these mill firms are large sums, compared with the amount of assets and equities of the present cotton cooperatives. The assets of the large cotton marketing cooperatives are similar when they have large stocks of cotton in their inventories, but their equities are small in comparison with equities of mill firms.

However, inspection of the assets, equities, and returns of individual mill firms indicate several of them had less than $100 million in assets and made net returns of 20 percent or more before income taxes. Some with less than $50 million in total assets also made net returns of about 20 percent or more. Mill firms, as stated above, are tending to become larger as measured by total assets and reflected in average assets by years included in table 8.

Table 8.—Financial information on selected U.S. textile mills, 1963-67[1]

Item	Unit	1963	1964	1965	1966	1967	5-year average or range (unweighted)
Mills	No.	25	26	28	27	25	26
Percentage return on owner equities (or net worth):[2]							
Average before income taxes	Pct.	14.1	16.8	20.3	20.1	13.7	17.0
Range before income taxes	do.	2.1 to 30.7	4.6 to 26.5	6.0 to 29.8	6.0 to 31.0	−7.9 to 29.4	−7.9 to 31.0
Average after income taxes	do.	6.8	8.8	11.0	11.1	7.5	9.0
Range after income taxes	do.	1.1 to 14.7	0.9 to 14.4	3.9 to 15.7	4.1 to 16.3	−7.9 to 14.5	−7.9 to 16.3
Assets and equities of mills:							
Average assets per mill	Dol.	124,535,000	130,618,000	142,316,000	162,957,000	183,157,000	148,717,000
Range in assets of mills	do.	876,000 to 696,668,000	801,000 to 756,003,000	801,000 to 908,962,000	873,000 to 992,070,000	5,217,000 to 1,027,564,000	801,000 to 1,027,564,000
Average equity in mills	do.	74,420,000	80,881,000	85,888,000	97,473,000	107,704,000	89,273,000
Range in equities of mills	do.	482,000 to 396,284,000	522,000 to 430,634,000	522,000 to 494,006,000	611,000 to 555,882,000	4,653,000 to 582,441,000	482,000 to 582,441,000
Percentage average equities were of average assets	Pct.	59.8	61.9	60.3	59.8	58.8	59.9
Range in percentage equities were of assets	do.	33.2 to 94.9	36.8 to 92.7	22.8 to 91.8	22.9 to 93.0	32.6 to 93.3	22.8 to 94.9

[1] The selected mills spun and/or wove cotton or cotton and synthetic fibers. Some also bleached, dyed, printed, and did finishing work. Sources of data used for calculating information shown in table were (1) financial statistics on textile mills in America's Textile Reporter magazines, Vol. 79, No. 30, July 29, 1965; Vol. 81, No. 35, Aug. 31, 1967; and Vol. 82, No. 35, Aug. 29, 1968.

[2] Equities or net worth and percentages of returns were calculated from balance sheets and operating statements. Market values of equities may be different and percentages of returns would differ where market values are different.

The percentage that net worths were of total assets shows that owners do not necessarily have to own nearly all the mill assets. Many of the present cooperative gins and other cotton cooperative started with members owning low proportions of the association's assets. Textile firms could be acquired in similar ways by grower cooperatives. Selecting excellent management and acquiring an efficient mill setup and good sales outlets would probably present greater problems to growers than financing a textile operation.

Management is extremely important in textile mill operations. This is indicated by the wide ranges in net returns shown in table 8. Cotton cooperatives need the best management they can get, especially when they plan to enter new activities, such as textile processing and marketing.

A recent study in Texas indicated cotton textile mills could be built for $1 million to $3.25 million (23, pp. vii and viii). Cooperatives interested in cotton milling would need to investigate building versus purchase of an operating firm and also the economies of scale in textile milling.

Plans for selling the products of a cooperative textile mill will need adequate study. Yarns and cotton cloth are very specialized products of an established industry. If cotton growers should acquire a going concern, sales outlets might come with it. But if growers build a new mill, outlets would have to be developed. Some textile mills use agents for selling their products. A cooperative textile mill would need the best sales outlet or outlets it is possible to secure.

Another Texas study dealt with the economic and engineering aspects of operating cotton mills in a new area (21). Some of the relationships discussed in that report have wide application.

Sources of Information

Processing and marketing cotton products is a large and complex operation. Cotton growers who are interested in it need to collect, study, and evaluate large amounts of information. One USDA report referred to previously describes and analyzes the industry (18). It also includes a number of references in the Literature Cited on pp. 143-146.

Trade publications provide current information. One of the trade papers — "America's Textile Reporter" — published the information used for developing table 8. Other textile industry papers include "Textile World" and "Textile Bulletin."

The U.S. Department of Commerce has a textile division that publishes reports on textiles. Among its publications are "The Cotton Textile Cycle: Its Nature and Trend."

CONCLUSIONS AND RECOMMENDATIONS

Costs of 24 Arkansas cooperative gins can be reduced by (1) getting better control of higher-than-average costs at several gins; and (2) consolidating gins with inadequate volumes by dismantling and selling surplus gins; and (3) members of dismantled gins joining the remaining cooperative gins. However, these measures will not solve the problems of idle labor, high depreciation, seasonal operation, high power costs, and other problems arising from ginning cotton for growers.

The projections and analyses included in this study indicate that there are potential opportunities for cotton growers to make substantial savings through vertical coordination by developing a cooperative central ginning system and other divisions to handle, store, process, and market their cotton and cottonseed. The potential savings on central ginning alone were estimated to range from $5 to $10 or more a bale. Cotton quality can also be improved by better conditioning, better ginning, and by blending at central gins. They should be able to save $2 to $3 a bale by cooperative milling of cottonseed. Savings from a cooperative warehouse should range between $1 and $3 a bale and cooperative cotton marketing should return net savings of $1 or more a bale. On these three operations, growers should save $5 or more a bale.

There may be an opportunity for growers to enter cotton textile manufacturing and marketing, and they have interests in those parts of the cotton industry that need protecting. However, returns of textile firms engaged in manufacturing and marketing were lower than potential returns from cooperative central ginning, oil milling, warehousing, and cotton marketing. And capital requirements are large. Textile manufacturing and marketing is also more complex than ginning and other current cooperative cotton activities.

In view of these conclusions, FCS recommends that Arkansas and other cotton growers consider organizing cotton cooperatives for the purpose of developing and testing the practicality of central ginning and if it is found practical, expand central ginning as conditions warrant. If central ginning proves practical, these associations would control the cottonseed and lint from the cotton they ginned. They could either cooperate or merge with some or all the other cotton cooperatives now active in their areas, or develop divisions to mill the cottonseed and market the products, store seed cotton and baled lint, and market cotton lint.

These associations could join cotton cooperatives in other States or areas on a through study of the feasibility of cotton cooperatives entering textile manufacturing and marketing. Such a study might indicate a federation of large cotton cooperatives is needed for entering the textile field.

Careful but courageous action will be required to realize the potential opportunities for cotton cooperatives. FCS recommends that the best possible management be selected and employed. Good management, adequate capital, and adequate volumes are among the keys to successful cooperatives. If a large number of cotton growers become interested in cooperative central ginning and cotton handling they would have an adequate volume and they would either have or could borrow enough additional capital to meet capital requirements.

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